

## PROGRESSIVE ROASTING AND TOASTING MACHINE

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### Cross Reference and Claim of Priority

This application is related to Provisional Application 60/331,301 filed November 14, 2001. The benefit under 35 U.S.C.119(e) is hereby claimed for Provisional Application 60/331,301.

### Abstract

A food preparation apparatus having a food carrier holding one or more articles of food being removeably positioned on a transport mechanism for travel in a linear direction and being simultaneously rotated and advanced subjecting the food to a predetermined level of cooking heat wherein the carrier has a predetermined weakened area for improved handling of the food after cooking. A food preparation apparatus having a discharge station allowing finished products to safely exit and not immediately handled by the operator. Because of the magnetic rail system the food-mounting skewer stays in place horizontally (hangs in space,) while pushed further along the rail by the next product. This is extremely useful for operations such as amusement parks and carnivals where the operator's attention is frequently distracted. The food being discharged will simply move along the rail, and wait for the

operator, there is no chance of the product falling, or piling up due to lack of operator attention.

### Field of Invention

5           The invention pertains to automated cooking devices. The invention specifically relates to machines that are capable of simultaneously heating, rotating and transporting food products mounted on holding devices introduced into the machine. There is a specific entrance and exit for the transported devices, as opposed to a continuous or endless cooking apparatus.

### Background of the Invention

10           Various types of machines have been developed for heating, rotating and transporting food products mounted on skewers or other holding devices; incorporating a number of different technologies. *Zenos*, U.S. Patent No. 3,734,740, incorporates a pair of chain  
15 conveyors, each having corresponding support brackets designed to accommodate opposite ends of a skewer upon which a food product is mounted. The chain conveyors transport the skewered food past heating elements at a fixed speed to heat the food.

20           *Boosalis, deceased et al.*, U.S. Patent No. 4,440,071, employs two vertically oriented chain conveyors to transport skewer mounted food past a series of heating elements and a gear toothed rack adjacent one conveyor to impart a rotational motion to the skewers to control the evenness of heating of the skewered food.

*Neresian*, U.S. Patent No. 5,490,451, utilizes an overhead chain conveyor to suspend and transport a series of vertically oriented skewers past a series of heating elements and

reflectors arranged in vertical rows. Each of the skewers includes a stripper disk for removing the food products from the skewer and a clip to retain the products. The skewers circle the heating elements and reflectors until the food products are sufficiently heated.

*Spurgeon*, U.S. Patent No. 1,111,870, comprises a marshmallow-toasting machine that includes a gas burner ring over which a series of marshmallows mounted on skewers is rotated for toasting. The skewers are mounted to a series of drive wheels that are driven around a circular track by an X-shaped arm. This apparatus causes the skewers to rotate as they pass over the burner ring.

*Castronuovo*, U.S. Patent No. 3,744,403, discloses a marshmallow toasting device employing a rotating wheel having a series of skewer holders perpendicularly mounted to its upper surface. Skewers are fitted into the holders and marshmallows impaled upon the skewers. The disk rotates the skewers past a series of light bulbs mounted inside of a heat-reflecting cover to toast the marshmallows.

U.S. patent No. 1,984,700 describes a handle and core for frozen confections. The device comprises a length of wood or similar material having a handle end and a confection end. The confection end includes a number of indentations that facilitate breaking portions of the material off as the confection is eaten from the distal end. This facilitates removing further pieces of the confection without interference from the portion of the device from which the confection has already been eaten.

While other variations exist, the above-described designs for devices for heating, rotating and transporting food products mounted on skewers, skewers or other holding devices are typical of those encountered in the prior art. It is an objective of the present invention to provide a machine for evenly toasting and roasting food products in an automated fashion

while minimizing required handling during loading and heating. It is a still further objective of the invention to provide the above-described capabilities in an inexpensive and durable machine that is capable of extended duty cycles and that may be easily repaired and maintained. It is yet a further objective to provide these capabilities in a machine that may be readily adapted to local conditions such as altitude or ambient temperature. It is still a further objective to provide a machine for toasting and roasting of food products in which the tip of the food support skewer does not contact anything except the food product pierced in mounting. It is still a further objective to provide a machine for toasting and roasting of food products in a fashion that has a beginning and an end of production as opposed to a continuous around and around format as previously described in prior art. Finally, it is an objective of the invention to provide a means to remove the toasted or roasted food products from the devices holding them for heating that minimizes handling of the food products once heated and delivered to a consumer.

While some of the objectives of the present invention are disclosed in the prior art, none of the inventions found include all of the requirements identified.

### Summary of the Invention

The present invention addresses the deficiencies of prior art roasting and toasting machine inventions and satisfies each of the above objectives.

A progressive roasting and toasting machine providing the above features is constructed from the following components. An enclosure including a base with an upper surface and a lower surface is provided, said base and upper surfaces being parallel. Four vertical members of equal length join the upper and lower surfaces. A horizontal guide rail

mounted approximately two-thirds of the way up two of the vertical members is provided.

The guide rail is parallel to the above described mutually parallel base and upper surfaces.

The guide rail is constructed of ferromagnetic material of U-shaped cross section. It

comprises two pieces with a coupling that aligns the segments. The coupling is located at the

point where the guide rail emerges from between the upper and lower surfaces. This permits

removal of the portion of the guide rail outside of the rectangular volume enclosed by the

upper and lower surfaces for easier packing and shipping. Multiple permanent magnets of

rectangular cross section and width equal to the inside width of the slot in the guide rail are

provided. The magnets extend the full length of the guide rail. The spacing of the magnets

varies along the length of the guide rail, such that in the portion of the guide rail within the

above rectangular volume the spaces between magnets approximates 1/3 of their individual

lengths and outside the volume the space between magnets approximates their full length. The

height of said permanent magnet is 1/3 of the depth of the slot in the guide rail.

A removable skewer holder is provided. The skewer holder is formed of

ferromagnetic material. This skewer holder comprises four concentric cylindrical sections

each of predetermined width with a first end, and a second end. A cavity extends from the first

end, but not all the way through, toward the second end. The cylindrical sections, starting

from the first end are term the first section, the second section, the third section and the forth

section. The diameters of the second and forth cylindrical sections are equal, and are less than

the diameter of the third cylindrical section, such that the skewer holder rests on the top

surfaces of the guide rail without the second cylindrical contacting the bottom of the guide

rail. The diameter of the first cylindrical section is less that the diameter of the second and

forth cylindrical sections. Because the diameter of the second and forth cylindrical sections

are equal, and the width of the larger diameter section of the skewer holder is less than the width of the slot in the guide rail, the skewer holder does not bind as it is moved along the slot in the guide rail. Hereinafter, the first cylindrical section of the skewer holder is referred to as the roller.

5 A food-mounting skewer is provided. The food-mounting skewer of second predetermined length has a first end and a second end. The first end of the food-mounting skewer is sized and shaped to pierce food portions. The second end of the food-mounting skewer is sized and shaped to fit, and to be held by friction, within the cavity of the skewer holder. The food-mounting skewer is unique and key feature to the invention by virtue of the  
10 thermal characteristics of the balsa wood of which it is made and the scoring across its length that allows for individual portioning of multiple products along its length. In the preferred embodiment there are two scores for accommodating three marshmallows.

A helix-shaped, spring-like, drive is provided. The helix-shaped drive has a first end, a second end, a third predetermined length and a second predetermined diameter. The pitch of  
15 the helix-shaped drive is sized to permit the diameter of the first roller fits between adjacent coils of the helix-shaped drive. A helix-shaped drive support is provided. The helix-shaped drive support is located adjacent and parallel to the first guide rail. It is sized and shaped to support the helix-shaped drive such that the an outer portion of the first roller of the skewer holder is located between adjacent coils while an inner portion of the first roller is located on  
20 the top edge of the guide rail. The helix-shaped drive support is secured to the upper surface of the base. A motor outside of the rectangular volume, via a coupling, rotates the helix-shaped drive at one or more speeds. A heating element is provided. The heating element is

suspended above the food-mounting skewer when the skewer is mounted in the cavity of the roller and extends along the helix-shaped drive within the rectangular volume.

When a food portion is pierced with the first end of the food-mounting skewer and the second end of the food-mounting skewer is fitted into the cavity at the roller, the skewer holder is positioned with the roller on the top edge of the first guide rail and between adjacent coils of the helix-shaped drive, the heating element energized and the helix-shaped drive rotated, the food portion will be uniformly heated and rotated on the food-mounting skewer as it moves beneath the heating element.

In a variant of the invention, a second horizontal guide rail is provided. The second guide rail has a first end and a second end separated by the first predetermined length, parallel top and bottom edges separated by the first predetermined height, parallel inner and outer sides separated by the first predetermined width, and is formed of ferromagnetic material. The second guide rail is parallel to and spaced from the first guide rail. Means are provided for magnetizing the second guide rail.

A second skewer holder is provided. The second the skewer holder is formed of ferromagnetic material and is attached at the second end to the central portion of the outer planar surface such that the first roller and the second roller have a single axis of rotation. The second roller bears upon the top edge of the second guide rail. The second guide rail and second roller further stabilize the skewer holder as the helix-shaped drive moves the skewer holder and the food-mounting skewer under the heating element.

In a further variant of the invention, an enclosing hood is provided. The hood contains the heating element attached to, and removable from, the base. In still a further variant, a heat resistant lubricating coating is applied to an upper surface of the helix-shaped drive support.

In yet a further variant, the hood further comprises a removable heat shield positioned above the heating element.

In another variant, the helix-shaped drive support includes a central cavity extending from its first end to its second end. A lower surface of the helix-shaped drive support includes a first opening. The overall structure has four supporting legs serving to elevate the base above a horizontal surface.

In still another variant, a third opening is provided. The third opening penetrates the base adjacent the second opening and below the first horizontal guide rail. The ventilating fan is sized shaped and located to direct airflow into the second, first and third openings. When the ventilating fan is activated airflow will be directed into and through the helix-shaped drive support and into the vicinity of the first horizontal guide rail.

In a further variant of the invention, a fourth opening is provided. The fourth opening located in the base adjacent the means for rotating the helix-shaped drive. An exhaust fan is provided. The exhaust fan removes heated air from the vicinity of the means for rotating the helix-shaped drive.

In still a further variant, the heating element is powered by electricity. In another variant, the heating element is powered by gas. In yet another variant, an auxiliary storage rack is provided. The storage rack includes a pair of parallel members. Each of the members has an upper edge that extend outwardly from the first and second guide rails at the level of the top edges of the guide rails. The members are attached to—and removable from—the guide rails. Means are provided for supporting the storage rack. When the food portions mounted on the food-mounting skewer and secured to the skewer holder have passed under



the heating element, they are stored in the storage rack for later distribution without further handling.

In still another variant of the invention, the enclosing hood includes ducting to isolate the means for rotating the helix-shaped drive from the heating element. In yet another variant,  
5 the enclosing hood includes a storage compartment capable of storing the mounting plates, food-mounting skewers and auxiliary storage rack.

In a further variant of the invention, the means for rotating the helix-shaped drive is an electric motor. In still a further variant, the progressive roasting and toasting machine includes a motor speed control. In yet a further variant, a heating element control circuit is  
10 provided. In another variant, a grease pan for catching drippings is provided. The pan is located below the heating element and angled to allow any grease contacting the pan to flow downwardly to an orifice located at a predetermined location. A removable grease storage container is provided. When the machine is used for roasting food portions that emit grease when heated, the grease is channeled to the storage container for disposal fire hazard  
15 reduction.

The food-mounting skewer may include one or more score marks between its first end and its second end. The food-mounting skewer is formed of material that may be easily broken at the score mark, leaving smooth edges adjacent a break. When the food portions are located on the food-mounting skewer with the food portions adjacent either the score mark or  
20 first end of the food-mounting skewer, the food portions are removable from the food-mounting skewer by breaking the skewer at the score mark and sliding the food portion over a minimum distance along the length of the skewer.

In a final variant of the invention, an automatic loading mechanism is provided. The mechanism comprises a vertically positioned guide rail with magnets aligned with and perpendicular to the horizontal guide. The vertical guide rail joins the horizontal guide rail at the end nearest the drive motor and with the slots aligned as described permits the largest diameter cylinder of the skewer holder to move smoothly from one to the other. As described previously, the spacing between the magnets in the slot of the vertical guide rail is varied such that the magnets are closely spaced at the top of the guide rail and less closely spaced at the bottom. Thus, the helix-shaped drive is able to overcome the magnetic force holding the skewer holder in the vertical guide rail and remove the skewer holder from the vertical slot and move it along the length of the horizontal guide rail. An opening in the top surface is provided to accommodate the vertical guide rail, skewer holder, skewer and the product. Support of the vertical guide rail is provided by a coupling at the junction with the horizontal guide rail and a bracket connected to the top surface.

The accompanying drawings and the detailed description of a preferred embodiment and some of the alternatives provides a greater understanding of the invention.

#### Description of the Drawings

**Figure 1** is a perspective view of the preferred embodiment of the invention;

**Figure 2** is a partially cut-away plan view of the **Figure 1** embodiment illustrating the helix-shaped drive, heating element and the skewer holder, skewer and food products;

**Figure 3** is a cut-away side view of the **Figure 1** embodiment illustrating the progression of the skewer holders along the rails;

**Figure 4** comprises two parts

**Figure 4A** is an enlarged detail of the helix-shaped drive, skewer holder and rails of the **Figure 1** embodiment;

**Figure 4B** is an enlarged detail of the helix-shaped drive, skewer holder and rails of the a second embodiment of the invention in which the skewer holder is positioned alongside of the rails; and

**Figure 5** is a perspective view of the skewer holder, skewer and food products illustrating the breakaway feature of the skewer;

#### Detailed Description of the Preferred Embodiment

Referring to figure 1, the overall enclosure comprises a top surface 101 and a bottom surface 102 connected by four vertical components 103. Two brackets 104 attached to two of the vertical components 103 support the, two piece, horizontal, guide rail and coupling 105 and helix-shaped drive 106. Element 107 comprises the skewer holder, into which skewer 108 is inserted and friction held. Coupling 109 drives the helix-shaped drive. The DC motor (not shown in this view) which drives coupling 109 and the heating coils within the heater and hood assembly are controlled by control box 111.

Referring to figure 2, a partial plan view of the invention, motor 201 is connected via its drive gears 202 to the previously mentioned coupling 109.

Control box 111 has mounted thereupon two-position switches 203 and 204 that control power to motor 201 and heater coil 205, respectively. The speed of motor 201 is controlled by rotary dial 206 mounted on control box 111. Element 211 is the heater hood.